Trend Study 3-12-01

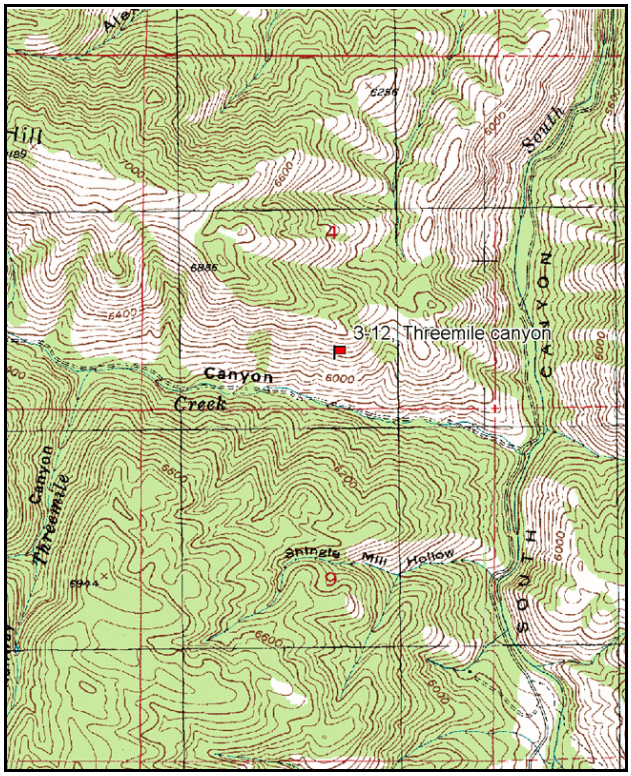
Study site name: Threemile Canyon . Vegetation type: Bitterbrush .

Compass bearing: frequency baseline 159 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar: belt 1 on 3 ft.

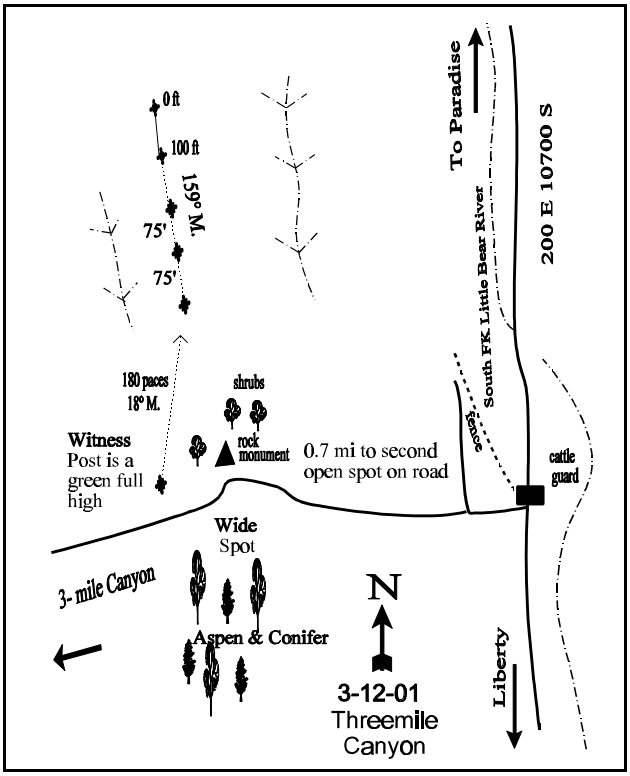
LOCATION DESCRIPTION

From 200 East and 10700 South in Avon, proceed south (towards Liberty) on a dirt road for 7.0 miles. Cross the cattle guard and turn immediately right (west). Travel. 0.7 miles up Three-mile Canyon and stop adjacent to a green and white witness post on the right side of road. Walk 180 paces at 18 degrees magnetic from the witness post to the last baseline stake. From the last baseline stake to the 0-foot baseline stake walk 400 feet at an azimuth 340 degrees magnetic. The 0-foot stake is marked by browse tag #7982.



Map Name: James Peak

Township 8N , Range 1E , Section 4



Diagrammatic Sketch

UTM 4589284 N 429627 E

DISCUSSION

Trend Study No. 3-12

The Three-Mile Canyon study samples a sparse but heavily used mixed bitterbrush/sagebrush community in Three-mile Canyon, a tributary of the South Fork of the Little Bear River. The area is on a very steep (60%), south facing slope at an elevation of about 6,120 feet. Winter deer use can be heavy during average as well as severe winters. Use of the available browse was very heavy in 1984 and moderately heavy in 1990. Deer use was light in 1996 and 2001. Elk use was very light. Pellet group transect data taken in 2001 estimated 26 deer days use/acre (65 ddu/ha) and 2 elk days use/acre (5 edu/ha).

Soil is classified as "Sheep Creek Cobbly Loam", a soil series that is very cobbly throughout becoming more clayey in the subsoil. Drainage is excellent with moderate permeability and very rapid runoff potential. Although the soil has a high erosion hazard, an erosion condition class assessment done in 2001 shows the soil to be stable with little erosion shown at that time. This soil is only moderately deep (28-40 inches to fractured limestone bedrock) and often has a calcareous accumulation at approximately 22 inches depth. Surface horizons range from neutral to slightly alkaline (Erickson and Mortensen 1974). Sampled soils on the site have a clay loam texture with a neutral soil reaction (7.2 pH). Effective rooting depth (see methods) was estimated at 16 inches in 1996. Rocks are common on the surface and within the profile. Soil temperature is relatively high at 67°F at an average depth of 16 inches. Vegetation and litter cover are abundant and well dispersed.

Browse composition consists of a moderate stand of antelope bitterbrush interspersed with a low density mountain big sagebrush. Small amounts of mountain snowberry, Wood's rose and serviceberry are also present on or around the site. The key species, bitterbrush, had an estimated density of 820 plants/acre in 1996, decreasing slightly to 700 plants/acre in 2001. Density estimates are higher since 1990 due to a much better estimate given by the greatly enlarged sample used in 1996 and 2001. The entire population displayed heavy use in 1984, with use decreasing to a more moderate level since then. Percent decadence was quite high at over 40% in 1984 and 1990. However, percent decadence has declined considerably, 5% in 1996 and 17% in 2001. Recruitment from young plants was low in 2001. The average number of young in the population since site establishment has not been adequate to replace the dead within the population. Vigor remains normal throughout the population. Average leader growth on bitterbrush was about 4 inches in 2001.

Mountain big sagebrush density has steadily declined with each reading. Much of the decline is the result of the change in sample size since 1996, giving a much better estimate of shrub populations. Currently ('01), an estimated 100 mountain big sagebrush plants/acre occur on the site. Utilization was heavy in 1984, but use has steadily decreased and is currently light. Percent decadence has ranged from 40-50% in all sampling years. Recruitment by young plants into the population remains low. The average number of young plants since 1984 has not been adequate to replace the dead within the population.

The herbaceous understory is dominated by the annual grasses, cheatgrass and Japanese brome, which account for over 70% of the grass cover in 1996 and 2001. Desired perennial species such as bluebunch wheatgrass, Sandberg bluegrass and Great Basin wildrye are also present. They have maintained fairly stable frequencies between 1996 and 2001. However, these species combined only provide about one-forth of the grass cover in 2001. As with several other studies in this unit in 2001, bulbous bluegrass a less desirable perennial, has significantly increased on this site. Forbs can be found in fairly large numbers but are mainly low growing and/or increaser species which include Louisiana sagebrush, yellow salsify and prickly lettuce. Arrowleaf balsamroot is perhaps the most desirable forb, but it occurs only occasionally.

1984 APPARENT TREND ASSESSMENT

Considering the high erosion hazard of this soil and the steep slope, soil movement is surprisingly low. Soil trend appears stable. Vegetative trend is more complicated. Although the study samples an area that is obviously important to and favored by wintering deer, the existing stand of browse seems to be declining. Current forage production is good, but certainly not outstanding. An increasing grass cover does not argue well for the future of sagebrush.

1990 TREND ASSESSMENT

Bitterbrush and mountain big sagebrush populations both decreased, 22% and 67% respectively. Together, it indicates a definite downward trend for these key browse species. A moderating factor is that, while in 1984 all the bitterbrush were classified as heavily hedged, in 1990 all form classes were represented, suggesting generally lighter utilization. Bitterbrush canopy cover was estimated at 5%. Sagebrush cover was too low to measure with the variable plot method. A significant decline in nested frequency was noted for bluebunch wheatgrass, and large increased frequency was measured for yellow salsify (*Tragopogon dubius*). Ground cover characteristics are almost unchanged.

TREND ASSESSMENT
soil - stable (3)
browse - down (1)
herbaceous understory - slightly downward, poor composition (2)

1996 TREND ASSESSMENT

The soil trend is up due to a decline in percent bare ground from 21% to 5% and an increase in percent cover of litter from 41% to 64%. Vegetation and litter cover are abundant and well dispersed. No erosion is evident on the site. Trend for browse is stable but limited. Density of bitterbrush is estimated at 820 plants/acre with the new, much larger sample size. Utilization is mostly moderate and percent decadence low at 5%. Recruitment appears sufficient to maintain the population. Mountain big sagebrush has a density of only 180 plants/acre, providing little forage. It only contributes 5% of the browse cover at this time. Reproduction is limited and likely hindered by the abundant herbaceous understory. Trend for the herbaceous understory is down slightly due to a decline in the sum of nested frequency for perennial grasses. Nested frequency for perennial forbs increased, but the increase came primarily from weedy species.

TREND ASSESSMENT
soil - up (5)
browse - stable overall (3)
herbaceous understory - down slightly and dominated by annuals and weedy perennial forbs (2)

2001 TREND ASSESSMENT

Trend for soil is stable. The abundance of herbaceous vegetation and litter cover effectively limits erosion. Trend for browse is slightly down. Bitterbrush density slightly decreased with a reduction in the number of young plants and percent decadency increased. Decadency in the mountain big sagebrush population remains at a moderately high level (40%). Those classified with poor vigor increased from 0% to 20%. These negative parameters are likely drought related and should improve with normal precipitation in the future. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses and forbs remains stable. Annual species are still abundant in the understory, but overall they did not increase in 2001.

TREND ASSESSMENT
soil - stable (3)
browse - slightly down (2)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 12

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	$_{b}$220	$_{a}$164	$_{a}$120	$_{a}$131	83	70	47	52	4.64	7.90
G	Bromus japonicus (a)	-	-	$_{b}$354	$_{a}$205	-	-	99	65	20.07	8.06
G	Bromus tectorum (a)	-	-	$_{a}$209	$_{b}$276	-	-	66	76	6.28	22.38
G	Carex spp.	-	-	-	3	-	-	-	1	-	.00
G	Elymus cinereus	$_{a}$-	$_{a}$1	$_{b}$22	$_{ab}$13	-	1	7	4	1.63	1.83
G	Poa bulbosa	$_{a}$-	$_{b}$18	$_{b}$11	$_{c}$75	-	9	5	27	.12	1.57
G	Poa secunda	$_{a}$-	$_{b}$32	$_{b}$18	$_{b}$18	-	16	10	9	.20	.20
Total for Annual Grasses		0	0	563	481	0	0	165	141	26.36	30.44
Total for Perennial Grasses		220	215	171	240	83	96	69	93	6.60	11.52
Total for Grasses		220	215	734	721	83	96	234	234	32.96	41.97
F	Achillea millefolium	-	-	6	6	-	-	2	2	.03	.06
F	Agoseris glauca	$_{b}$34	$_{b}$19	$_{a}$5	$_{a}$1	19	11	2	1	.01	.01
F	Allium acuminatum	17	-	-	-	6	-	-	-	-	-
F	Alyssum alyssoides (a)	-	-	88	109	-	-	36	46	.30	1.23
F	Artemisia ludoviciana	$_{a}$25	$_{a}$30	$_{a}$29	$_{b}$56	10	10	11	20	.88	3.27
F	Aster chilensis	-	-	1	1	-	-	1	1	.06	.00
F	Balsamorhiza sagittata	14	16	6	14	7	9	2	6	1.75	2.82
F	Camelina microcarpa (a)	-	-	1	5	-	-	1	3	.00	.04
F	Calochortus nuttallii	$_{a}$-	$_{b}$8	$_{a}$-	$_{ab}$2	-	5	-	1	-	.00
F	Cirsium spp.	$_{a}$1	$_{b}$29	$_{a}$13	$_{a}$2	1	15	8	2	.37	.06
F	Collomia linearis (a)	-	-	$_{b}$44	$_{a}$10	-	-	21	4	.18	.02
F	Collinsia parviflora (a)	-	-	3	1	-	-	1	1	.00	.00
F	Crepis acuminata	$_{a}$-	$_{c}$29	$_{b}$21	$_{ab}$6	-	13	9	3	.22	.09
F	Epilobium brachycarpum (a)	-	-	$_{b}$104	$_{a}$18	-	-	40	8	.91	.04
F	Erodium cicutarium (a)	-	-	-	10	-	-	-	6	-	.13
F	Galium aparine (a)	-	-	3	-	-	-	1	-	.03	-
F	Hackelia patens	-	-	-	6	-	-	-	2	-	.06
F	Holosteum umbellatum (a)	-	-	$_{a}$7	$_{b}$77	-	-	4	32	.02	.33
F	Isatis tinctoria	$_{a}$-	$_{ab}$4	$_{ab}$7	$_{b}$16	-	2	4	7	.16	.22
F	Lappula occidentalis (a)	-	-	$_{a}$2	$_{b}$18	-	-	1	7	.00	.06

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Lactuca serriola	$_{a}$-	$_{b}$43	$_{c}$99	$_{c}$113	-	21	44	48	1.13	2.82
F	Lesquerella spp.	-	-	-	2	-	-	-	1	-	.00
F	Lithospermum ruderale	-	-	12	6	-	-	4	3	1.06	.45
F	Lomatium grayi	-	1	-	-	-	1	-	-	-	-
F	Polygonum douglasii (a)	-	-	-	1	-	-	-	1	.00	.00
F	Ranunculus testiculatus (a)	-	-	-	3	-	-	-	1	-	.00
F	Senecio multilobatus	$_{b}$41	$_{a}$-	$_{a}$-	$_{a}$2	21	-	-	1	-	.00
F	Tragopogon dubius	$_{a}$32	$_{c}$185	$_{c}$195	$_{b}$76	12	78	80	36	5.07	2.05
F	Unknown forb-perennial	-	-	-	16	-	-	-	7	-	.13
F	Veronica biloba (a)	-	-	21	45	-	-	10	19	.70	.14
Total for Annual Forbs		0	0	273	297	0	0	115	128	2.17	2.01
Total for Perennial Forbs		164	364	394	325	76	165	167	141	10.78	12.09
Total for Forbs		164	364	667	622	76	165	282	269	12.96	14.11

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 12

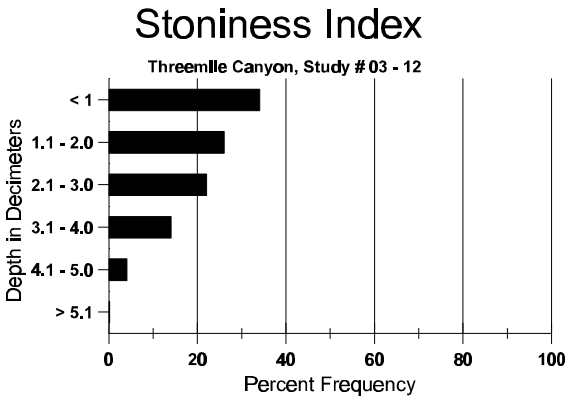
Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	8	5	.41	-
B	Mahonia repens	2	2	.15	.03
B	Purshia tridentata	25	27	8.01	7.73
B	Rosa woodsii	5	4	.24	.03
Total for Browse		40	38	8.81	7.79

BASIC COVER --
Herd unit 03 , Study no: 12

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	394	380	3.50	9.00	56.96	62.90
Rock	167	150	15.25	12.75	5.47	8.76
Pavement	72	178	10.25	17.00	.50	5.16
Litter	397	357	49.75	40.50	64.06	33.45
Cryptogams	-	-	.75	0	0	0
Bare Ground	146	146	20.50	20.75	4.86	7.33

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 12, Threemile Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
16.1	67.4 (16.3)	7.2	27.3	40.7	32.0	3.1	15.8	201.6	.6



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 12

Type	Quadrat Frequency	
	'96	'01
Elk	1	-
Deer	5	13
Cattle	-	1

Pellet Transect	
Pellet Groups per Acre ⁄01	Days Use per Acre (ha) ⁄01
26	2 (5)
340	26 (65)
-	-

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 12

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier alnifolia																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	29	34	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'84	0		-
	'90	0		-
	'96	0		-
	'01	0		-

Artemisia tridentata vaseyana																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	4	13	-	-	-	-	-	-	17	-	-	-	566	26	32	17
	90	1	4	-	-	-	-	-	-	-	5	-	-	-	166	21	17	5
	96	3	-	-	1	-	-	-	-	-	4	-	-	-	80	18	22	4
	01	2	-	-	-	-	-	1	-	-	3	-	-	-	60	19	22	3
D	84	-	-	13	-	-	-	-	-	-	13	-	-	-	433			13
	90	1	3	1	-	-	-	-	-	-	2	-	-	3	166			5
	96	1	2	-	1	-	-	-	-	-	4	-	-	-	80			4
	01	2	-	-	-	-	-	-	-	-	1	-	-	1	40			2
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	13%	87%	00%	-67%
'90	70%	10%	30%	-46%
'96	22%	00%	00%	-44%
'01	00%	00%	20%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'84	999		43%
	'90	332		50%
	'96	180		44%
	'01	100		40%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Mahonia repens																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	16	-	-	-	-	-	16	-	-	-	320	6	6	16
	01	9	-	-	12	-	-	-	-	-	21	-	-	-	420	-	-	21

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	+27%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:
'84	0		-
'90	0		-
'96	320		-
'01	440		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Purshia tridentata																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	-	-	10	-	-	-	-	-	-	10	-	-	-	333	30	48	10
	90	4	2	2	-	-	-	-	-	-	8	-	-	-	266	25	48	8
	96	9	20	5	-	-	-	-	-	-	34	-	-	-	680	32	59	34
	01	11	12	5	-	-	-	-	-	-	28	-	-	-	560	34	57	28
D	84	-	-	8	-	-	-	-	-	-	8	-	-	-	266			8
	90	2	1	3	-	-	-	-	-	-	4	1	-	1	200			6
	96	-	1	-	-	-	1	-	-	-	2	-	-	-	40			2
	01	4	1	1	-	-	-	-	-	-	6	-	-	-	120			6
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	160			8
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	100%	00%	-22%
'90	21%	36%	07%	+43%
'96	51%	15%	00%	-15%
'01	37%	17%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	599	Dec:		44%
'90	466			43%
'96	820			5%
'01	700			17%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Rosa woodsii																		
Y	84	5	-	-	-	-	-	-	-	-	5	-	-	-	166			5
	90	33	-	-	-	-	-	-	-	-	33	-	-	-	1100			33
	96	6	2	-	-	-	-	-	-	-	8	-	-	-	160			8
	01	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
M	84	5	-	-	-	-	-	-	-	-	5	-	-	-	166	7	4	5
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	8	5	-	-	-	-	-	-	-	13	-	-	-	260	12	11	13
	01	10	-	-	-	-	-	-	-	-	10	-	-	-	200	17	12	10

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	+70%
'90	00%	00%	00%	-62%
'96	33%	00%	00%	-19%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	332	Dec:		-
'90	1100			-
'96	420			-
'01	340			-

Symphoricarpos oreophilus																		
Y	84	3	-	-	-	-	-	-	-	-	3	-	-	-	100			3
	90	2	1	-	-	-	-	-	-	-	2	1	-	-	100			3
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	1	1	1	-	-	-	-	-	-	3	-	-	-	100	18	43	3
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	-	1	-	-	-	-	-	-	1	-	-	-	33			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	14%	29%	00%	-57%
'90	33%	00%	00%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'84	233	Dec:	14%
'90	100		0%
'96	0		0%
'01	0		0%